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Statement of

The Under Secretary of Defense for Acquisition and Technology
Honorable Paul G. Kaminski

Before the
Subcommittee on Acquisition and Technology of the
Senate Committee on Armed Services

on

FY 1997 DoD Acquisition and Technology Program

March 20, 1996

Mr. Chairman, Members of the Subcommittee, and staff, thank you for the opportunity to appear before you today to discuss the Department of Defense Acquisition and Technology Program.

The United States has the best led, trained and equipped military force in the world today. Since World War II, fielding technologically superior forces has been the cornerstone of our national military strategy. This advantage has allowed our forces to deter, and when deterrence failed, prevail over numerically large enemy forces. Our predecessors invested wisely in technology in the 1960s and 1970s. The result was an overwhelming, swift, decisive victory in Desert Storm and a continuing deterrence of our potential adversaries.

In today's post-Cold War world, our planning must cope with increased uncertainty. We are far less certain about who our future adversaries will be or what technology we will face. In today's global economy, everyone, including our potential adversaries, will gain increasing access to the same commercial technology base. The military advantage will go to the nation which has the best cycle time to capture technologies that are commercially available; incorporate them in weapon systems; and field new operational capabilities.

Mr. Chairman, the strategic focus of the defense acquisition and technology program is on fielding superior operational capability and reducing weapon system life cycle costs. We have maintained this focus since the Gulf War. As impressive as our military accomplishments were against Saddam Hussein, our forces are qualitatively superior today. We received an inkling of what combat will look like in the 21st century in our support of the NATO combat Operation DELIBERATE FORCE in Bosnia.

In DESERT STORM, only two percent of the weapons expended during the air war were precision guided munitions (PGMs). During the NATO combat Operation DELIBERATE FORCE in Bosnia, PGMs accounted for over 90 percent of the ordnance expended by U.S. forces. We have employed these weapons with great precision. The bomb damage assessment (BDA) photographs in Bosnia bear no resemblance to BDA photos of the past where the target, often undamaged, is surrounded by craters. The Bosnia BDA photos show one crater where the target used to be and virtually no collateral damage. We have moved to one target, two weapons, and are moving to a situation of one target, one weapon. This has been the promise for the past 20 years, now it is becoming a reality.

Mr. Chairman, I am pleased to report that these capabilities are being fielded at less cost to the American taxpayer. This would not have been possible without the help and support from the Members of this Subcommittee. Working together, the Congress and the Department have implemented sweeping acquisition reforms that are reducing the life cycle costs of our weapon systems. We now have examples of cost avoidance in the range of 15 to 50 percent. As these savings and cost avoidance opportunities are identified, they are applied during the Department's budget process. The President's FY 1997 budget request includes the benefits of the Department's on-going program of acquisition reform.

TECHNOLOGY STRATEGY

One point that I made before the subcommittee last year, but one that always needs emphasizing, is that stable, sustained investments in the technology base, technology "on-ramps" and advanced concept technology demonstrations (ACTDs) are essential for military superiority. A long commitment to this strategy is required over years and decades to achieve significant results; it is not possible to wait until advanced technology is clearly needed in a system to begin investment; by then, it is too late.

Today's leading edge systems were made possible through decades of investment in fundamental science and exploratory development work. The technology base initiated in the 1960's and the technology "on-ramps" sustained in the 1970's gave us the stealth aircraft, precision guided munitions, and night vision systems that provided U.S. forces with a decisive combat edge during the 1991 Gulf War. As I pointed out last year, the Air Force's F-117 stealth fighter, so effective in Desert Storm, can be traced to a mathematical formulation for radar scattering from geometric shapes and the development of radar absorbing materials that date back to the early 1960's.

Technology Base

Basic Research

The Basic Research or 6.1 account within the RDT&E appropriation is the source of new knowledge and understanding that ultimately forms the foundation for future military capabilities. Over the 50 years since DoD founded its first basic research office, basic research has sometimes paid immediate dividends, with a transition of technology directly from the laboratory bench to defense systems in the field. For example, last year researchers applied high speed, experimental computational fluid dynamics (CFD) techniques to solve an operational problem encountered on the C-17 airlifter. During

certain flight regimes, paratroops deploying on each side of the C-17 would "bump-and-tangle." CFD technology enabled engineers to quickly define the combination of C-17 flight parameters (airspeed and angle-of-attack) that allows paratroopers to safely and simultaneously exit from both sides of the aircraft.

In most cases though, the full benefits of the Department's investment in basic research do not become apparent until much later. It is only in hindsight that we are able to clearly discern the patterns of basic research that spawned revolutionary military capabilities over the past several decades--such as the capabilities provided by the Global Positioning System, ARPANET, night vision, high speed computer chips, lasers, and fiber optics.

The Department's investment in basic research is focused on science and engineering areas with the greatest long-term potential for defense application. Even though DoD's total 6.1 funding is less than ten percent of the Federal investment in basic research, the DoD provides almost two-thirds of total Federal support for basic research in electrical engineering, mechanical engineering and materials science.

The importance of these DoD investments to national security can not be overstated, as evidenced by the promise of several recent scientific accomplishments. DoD-sponsored basic research has produced a way to make stable, high temperature silicon carbide fibers that can be used to make the parts for a new generation of high performance, low pollution aircraft engines. These engine parts will function at 2000 degrees without degradation--hundreds of degrees hotter than alternative materials. Our fertile nanoscience program has produced experimental operating transistors with feature sizes of 30 billionths of a meter. Building on this success, we are beginning to control electronic properties on a scale of less than 10 billionths of a meter. Circuits using such dimensions will have up to 1000 times the number of electronic components of todays computer chips--a quantum leap in circuit technology.

The Department benefits greatly from investment in basic research at universities, industry and in-house laboratories. Universities carry out about 60 percent of the total 6.1 program--basic research is a core competency of the universities and university research pays additional dividends through the associated training of future scientists and engineers in disciplines important to national defense. Approximately one-quarter of the 6.1 program is performed by DoD and other Federal laboratories to focus on areas where extramural capability is unavailable, and about 15 percent is performed by industry and nonprofit institutions other than universities.

With respect to resources, the President's FY 1997 budget request maintains zero real growth in the 6.1 basic research account. This carefully considered request reflects the importance that the Department places on sustaining the long-term foundation for future military capabilities. I urge your support of the full request.

Exploratory Development

The Exploratory Development or 6.2 account within the RDT&E appropriation is the second component of the Department's technology base investment and is the mechanism for exploiting new knowledge and understanding for future military capabilities. We are vigorously exploiting ten technology areas: sensors and electronics; information systems and technology; weapons; advanced materials and materials processes; airborne platforms; nuclear, biological, and chemical (NBC) defense; human systems; ground vehicles and watercraft; medical and biomedical; and space platforms.

One illustrative example of the military payoffs associated with sustained investment in 6.2 exploratory development programs is the F119 engine that powers the F-22 fighter. This engine, by virtue of it ability to sustain supersonic flight without

afterburning and its high thrust-to-weight ratio, dramatically increases the capability of the aircraft, as well as reducing the weight and cost penalties associated with stealth. There are many critical technologies that have made this engine possible: in the area of materials and processes alone, they include graphite polyimide fan components, hollow-bladed fans with an integral rotor, thermal barrier coatings for high-temperature parts, and various other processing techniques. All of these technology developments, and many more, date back to the Department's investment in 6.2 exploratory development programs in the 1970s and 1980s. Most of these programs were executed largely before the precise needs for the F119 or the F-22 were identified.

Technology Ramps

Superior weapon systems like the Army's "Big Five" heroes of DESERT STORM--Apache, Black Hawk, Patriot, Abrams and Bradley, the Air Force's F117 Stealth Fighter, and the Navy's Tomahawk cruise missiles are all products of well planned technology "on-ramps." It is clear that technology base investments, focused on specific technological objectives, must be made well in advance of specific system requirements. Nonetheless, as system requirements begin to emerge, it is also necessary to adjust science and technology (S&T) efforts, particularly in the 6.3 advanced development arena, to ensure that potential sources of technological risk are addressed. Technological risk is further reduced through technology insertion roadmaps leading to system level demonstration and validation and/or engineering and manufacturing development efforts.

An example that illustrates this point is the M829A1 kinetic energy projectile, used very effectively as a tank-killer in the Gulf war. As with many other developments, its technological origins can be traced to the 1960s, with fundamental efforts on energetic materials, mechanics of composite materials, and penetration mechanics. During the late 1970s and early 1980s, exploratory development efforts

addressed the more application-oriented areas of propulsion technology, aluminum and composite materials, and target interactions. These efforts, while focused on specific technological objectives that would improve kinetic energy projectiles, were not focused on a specific requirement. In the mid-1980s, however, when the need for a new projectile began to emerge, 6.3 advanced development efforts were initiated to focus on the technological risk associated with the specific design aspects of the projectile: charge, sabot, and penetrator. These risk-reduction efforts enabled a short development program leading to an initial operational capability (IOC) in 1989.

The Joint Strike Fighter program is a technology "on-ramp" for providing the U.S. Navy with a first day of the war survivable aircraft, the U.S. Air Force with a 21st century replacement of its F-16 fleet, and the U.S. Marine Corps with an AV-8B replacement. Technology insertion roadmaps exist to reduce risk and take advantage of technological advances in a more-electric airframe, shared radio-frequency apertures and sensors, shared electro-optical apertures and sensors, advanced packaging and cooling techniques for integrated avionics, and many others.

A final example illustrating a technology "on-ramp" for a specific application is in the air-to-air missile technology arena. We have maintained a sustained annual technology base investment in core technologies relevant to air-to-air missiles: advanced processing, fuzing, propulsion, and the like. However, when a specific application is identified, such as the AIM 9X, exploratory and advanced development investments are made in technology areas specific to the application to reduce the technological risk. Accordingly, we are currently making investments in areas such as high angle-of-attack operation, airframe control, and infrared guidance and integrated fuzing to reduce the risk associated with incorporation into the AIM-9X.

Advanced Concept Technology Demonstrations

In many cases, the technology associated with a new system or piece of equipment is mature and the technical risk is low, but the operational risk high. In order to gain acceptance in the field, the advanced technology must be married with a suitable employment doctrine. This is one thing that I think has not been given adequate emphasis in the past. We have traditionally underestimated the importance of developing the appropriate doctrine, the tactics for employment, the training, and the people who use technologically advanced systems.

Advanced Concept Technology Demonstrations (ACTDs) are designed to rapidly transfer technology from the developers to the users by focusing on concept--not technology--risk reduction. ACTDs are user-oriented and even user dominated. They are an integrated effort to assemble and demonstrate significant, new and improved military capability that is based upon mature advanced technologies. Each ACTD is based on actual military operations or demonstrations which are jointly developed and implemented with the operational users and material development communities as key participants.

In FY 1995, Congress and the Department of Defense initiated the first ten ACTDs. As originally conceived, ACTDs are relatively short-term efforts to assess the potential and develop the doctrine, concepts of operations and tactics for new technologies prior to committing to formal acquisition. ACTDs are a critical precursor to formal acquisition. As such they can support both our operational needs and our legitimate acquisition requirements and serve as a means to reduce both operational risk and acquisition cycle times.

ACTDs are specifically intended to be completed within two to four years. Of the ten initiated in FY 1995, several have already achieved their initial objectives and are completed or very near completion. All of these demonstrations have provided significant insight and added capability for operational forces. They have afforded the appropriate commanders with an opportunity to evaluate new technologies and assess the impact of this technology on their present and emerging military missions.

The most well known ACTD is the Predator Medium Altitude Unmanned Aerial Vehicle (UAV). Predator progressed from a concept to a three system operational capability in a period of less than thirty months. Each system consists of three air vehicles, the appropriate ground stations and communications support. Predator flew its first flight in July 1994 and deployed to the Bosnia theater in July 1995. On March 1 of this year Predator again deployed, as an ACTD, to European Command (EUCOM) to support Operation Joint Endeavor. On July 1, 1996, we are planning to complete the ACTD and transfer the Predator to the Air Force which will provide the UAV operational support to our Joint Task Force Commanders. Both the technical and operational lessons learned during the "real world" operational application of this ACTD are facilitating our acquisition of the Predator UAV.

In January 1996 we completed the Cruise Missile Phase I Mountain Top ACTD. This ACTD involved participation by the Navy, Army and Air Force and very successfully demonstrated the concept of cooperative engagement, supported by airborne sensors, of low flying cruise missiles. This is a critical step in assessing our future needs and the technology applications which will be needed to address the emerging cruise missile threat. The technical concept demonstrated during this ACTD provides us with the ability to significantly leverage our present surface and airborne weapons systems.

The Joint Countermine ACTD, still in execution, is a cornerstone of the Department's efforts to ensure that the countermine efforts in all of our military Services are coordinated and complementary. The ACTD addresses the issue of providing a joint task force commander with a seamless countermine capability which flows from the deep water, through the shallow water, surf zone, and up on to the land. As such, this ACTD involves significant participation by the Navy, Marine Corps, Army and our Unified Commanders. This ACTD is addressing many technologies relevant to the countermine issues in Bosnia and we are continually assessing, in coordination with the Joint Staff, the maturity of these technologies for possible deployment in support of Operation JOINT ENDEAVOR.

The ACTDs initiated in FY 1995 and the nine started in FY 1996 leverage approximately one billion dollars in military service and DoD agency technology programs. To ensure the ACTDs address the Warfighters' needs and requirements, they are coordinated closely with the Joint Staff through the Joint Requirement Oversight Council (JROC) and Joint Warfighting Capability Assessment (JWCA) groups. This coordination ensures that we focus our present and future ACTDs on legitimate present and emerging joint warfighting issues. The Joint Staff and JROC provides the critical link to the Unified Commanders-in-Chief (CINCs).

ACTDs are an effective, inexpensive means to evaluate the operational utility of mature technologies emerging from the DoD Science and Technology Program and from investment by other government agencies, industry or our allies. As indicated earlier, ACTDs are focused on the needs of the military user. They provide us with the ability to quickly respond to unanticipated needs and take advantage of technology advances before they proliferate or become obsolete.

Congress has provided the Department with a powerful tool which has been used in executing ACTDs. Section 845 of the National Defense Authorization Act for FY 1994 provided the Defense Advanced Research Projects Agency authority to conduct technology demonstrations and prototype projects of military systems using non-procurement contracts. Section 845 provides unparalleled flexibility in contracting. DARPA is successfully using this authority to conduct several projects including the high altitude endurance unmanned aerial vehicle program, Tier II Plus (Global Hawk) and the stealthy Tier III Minus (DarkStar). The Navy/DARPA program to apply commercial practices to the Arsenal Ship will also utilize this approach. With Section 845 authority, DARPA conducts experiments with the acquisition process and attempts to tailor the process for each project to achieve optimum results. DARPA has encouraged teaming, integrated product and process development, established

performance goals rather then specifications and introduced such innovations as having a single firm requirement, namely the price of production versions of the prototype.

S&T Strategic Planning Process

We have strengthened our requirements, technology assessment, technology development and demonstration processes with initiatives like Advanced Concept Technology Demonstrations and the Joint Warfighting S&T Plan. The Department has taken these steps to ensure the S&T program is militarily relevant and technically sound.

Working with the Joint Staff and Services, the Director of Defense Research and Engineering (DDR&E) has developed, and currently has in coordination, the Joint Warfighting S&T Plan. This plan supports the FY 1997 budget and is responsive to the Chairman of the Joint Chiefs of Staff (CJCS) vision for the future battlespace. It is directed towards exploiting the rapid pace of technology advances and gaining information superiority to enable enhanced dominant maneuver, precision engagement, full dimension protection and focused logistics operational concepts. The Department's future success in achieving this vision will in large measure depend upon supporting the technology roadmaps that are essential to achieving the joint warfighting capability objectives cited in the Joint Warfighting S&T Plan.

The Joint Warfighting S&T Plan complements the revised Defense Technology Area Plan and our first Basic Research Plan. Another innovation this year is that, in collaboration with the Services and Agencies, we have developed 300 Defense Technology Objectives and six Strategic Research Objectives to help focus and improve management of our S&T investment. These plans will be made available over the next several months to support industry and university decisions about how to invest their research funding.

MAJOR INITIATIVES

Dual Use Strategy

The Department's dual use strategy remains one key to ensuring our military forces will have affordable access to the world's best technology. Last year, I testified before this subcommittee that commercial industry surpassed the DoD in R&D spending back in 1965 and that the disparity between DoD and commercial sector investment in R&D has been growing wider ever since. Those trends have continued over the past year. The bottom line for the Department is that we have no choice but to move from separate industrial sectors for defense needs and commercial markets to an integrated national industrial base.

Leveraging the commercial sector, the essence of the dual use strategy, gives us a tremendous opportunity to field advanced weapons both more quickly and affordably. The Department's dual use strategy consists of three pillars:

- Invest in dual use technologies critical to military applications;
- Integrate military and commercial production;
- Insert commercial components into military systems.

The first pillar means leveraging the commercial sector's base of research and technology to foster militarily useful technology. The second involves leveraging the commercial sector's low cost production capabilities by manufacturing commercial and military items on the same production lines. The third pillar requires creating the incentives and management approaches inside the DoD necessary to facilitate using these dual use, "dual produced" items in military equipment.

Last year, I cited Multichip Modules (MCMs) as one example of the Department's investment in dual use technology. MCMs are semiconductor chips packaged together on a single substrate and integrated together into a single package or module. Because MCMs have application in a multitude of Defense systems, where they can offer increased performance and reliability in a smaller package, DoD jump-started this technology with early investments. Our aim at the outset was to improve the state of the art of the technology, and, more importantly, lower production costs so that MCMs became affordable for defense applications. The key to lower cost is larger production volume, and larger volume production comes from increased use of MCMs in commercial items.

I am pleased to report that the Department still expects to see a factor of ten decrease in costs as production volume increases. We are starting to see results from our investment. In 1990, the Defense Department was the only customer -- there was practically no commercial market. Last year, I was able to tell you that commercial applications are using over half of total sales of MCMs. That trend is continuing. Several of the companies that originally depended solely on the Department's research and development investment, such as nCHIP and MicroModule Systems, are now profitably producing hundreds of thousands of modules for commercial computer workstations.

These MCM manufacturers have also successfully produced dozens of prototype modules for use in military systems, and can expect to receive volume production orders for future defense systems. Until they do, they are being sustained through orders for their commercial products. The US manufacturing base for this important technology is robust but does not rely on DoD for its sole support. DoD gains access to the most advanced technology, without paying to support the entire manufacturing base, and can take advantage of low-cost, volume production for its specialized needs.

Holographic data storage is another technology with both military and commercial applications. In this case, the advancement of the technology is being accomplished with investments from DoD and from industry. Holographic data storage forms the new frontier in storage technology. Information is stored in a volume instead of on the surface of a disk. This makes possible the storage of 10s of gigabits of digital data in a volume the size of a sugar cube. The data can be found and retrieved 10 to 100 times faster than current storage devices and accessed at random.

The Photorefractive Information Storage Materials (PRISM) and the Holographic Data Storage System Consortia (HDSS) bring together prominent researchers from the universities, the aerospace industry, the computer industry, the electronics and materials industry, as well as a telecommunications provider and two small start-up companies. With equal funding contributions from industry and DARPA, these consortia carry out coordinated research and development programs on advanced holographic mass data storage technology leading to the development and demonstration of advanced storage platforms.

By leveraging each other's unique expertise, the consortia are able to perform an overall development task that none of the participants was willing or capable of carrying out on their own. More importantly, DoD does not have to bear the cost of this development task alone. Instead, government funding can stimulate and supplement this very important research and development effort. In return, DoD has the potential to gain storage devices of unequaled performance.

To date, the consortia have developed demonstration devices that store and retrieve vast amounts digital video and audio clips. As the military improves its data collection capabilities, the ability to store and access large amounts of data becomes paramount. The new data storage capability we expect from holographic data storage will have a major impact in such areas as intelligence, information warfare, target

recognition, and command and control operations. Commercial applications abound as well, for efficient data retrieval from libraries and image repositories.

Dual Use Applications Program

The FY 1997 President's Budget contains $250 million to begin the Dual Use Applications Program (DUAP), a joint program conducted by the three military departments, DARPA, and DDR&E. The DUAP will introduce dual use R&D approaches into the military Services as a new norm by developing dual use technologies for the direct benefit of military users. Building on lessons from our past experience in this area, the DUAP will embed this new way of doing business throughout the military services by building a cadre of people who understand and accept it through real experience with it. The Service Acquisition Executives are committed to using DUAP to apply technology they need and leverage dual use R&D more effectively in their departments.

DUAP funds will create an opportunity for service program managers to fund new technology through a dual use approach. R&D projects will be solicited as government/industry partnerships, selected to meet Service needs, and managed by the Services using new authorities and methods. Each project will include, up front, a clear path for the technology to be used in a military system. As a joint program, the DUAP will be a unique forum for all the Services to simultaneously refine and share what they learn about dual use R&D while working on technologies of joint interest. Without shared, joint learning in the right environment, our progress in making dual use a new norm will be much, much slower. Think of the DUAP as the joint dual use battlelab.

Commercial Technology Insertion Program

The Commercial Technology Insertion Program, being initiated in FY 1997 at a level of $50 million, will accelerate the insertion of commercial technologies into defense systems by working with the Services to identify opportunities and to provide the funds necessary to overcome barriers to insertion. Funds will be used to qualify commercial technology for defense systems; to adapt commercial technologies to meet military needs; or to modify military systems to accept a commercial technology.

An ongoing success story, the insertion of Active Matrix Liquid Crystal Displays (AMLCDs) in weapon system cockpits, is being used as a model for the CTIP. This project is being funded by Title III of the Defense Production Act and is providing funds to program offices to qualify and/or accelerate the purchase of AMLCDs into weapon systems. Seven AMLCD insertion efforts are underway. One of these efforts is the Army's AH-64D Longbow Apache helicopter which is in the middle of an upgrade program. The Apache Program Office wanted to incorporate AMLCDs into the Longbow but lacked the funds required to qualify them and was planning to use cathode ray tubes in their upgrade program. The insertion program is providing the funds required for qualification, allowing AMLCD technology to be incorporated into the Longbow with no schedule slippage and at a comparable acquisition cost. The results will be four new color displays per aircraft. These displays will be smaller, lighter in weight, and more reliable and capable than the previously planned equipment complement.

Project selection for the Commercial Technology Insertion Program is scheduled for April 1996, which will allow the Defense subcommittees to preview precisely where we propose to invest the FY 1997 funds. Selection will be based on the impact the technology will have on the defense system's life cycle costs and performance, the pervasive impact the technology will have on a range of defense systems and the commitment of the Service to provide downstream funding needed for the acquisition of the technology.

Small Business Innovation Research (SBIR) Program

This program is executed by the Services and Defense Agencies. Its objective is to involve small business in federal R&D, to increase the commercialization of technology developed by federal R&D, and to increase the use of commercial technology in defense systems. The program has been very successful and has resulted, for example, in development of innovative fuel cell technology to produce electricity and water and lightweight head mounted displays. Under the SBIR program, DoD will fund approximately $550 million in R&D projects at small technology companies in FY 1997--projects that serve a DoD need and have commercial potential.

Small Business Technology Transfer (STTR) Program

STTR is a three-year pilot program, initiated in 1993, under which DoD will fund $30 million in FY 1997 in cooperative R&D projects between a small technology company and a research institution (i.e., a university, federally-funded R&D center, or nonprofit research institution). The STTR program serves a different function than the one addressed by the SBIR program. It is a complementary program that enables a researcher at a research institution to spin-off a commercially promising, dual-use idea with a small technology company. Thus, whereas SBIR exploits the ideas in our small business sector, STTR taps into a vast new reservoir of dual-use ideas in our nation's research institutions.

Government-Industry-University Research Initiative

In the U.S. today, universities are the principal performers of long-term research. Industry has reduced the size of its in-house research laboratories, and its investment is oriented more towards near-term applied research, rather than long-term basic research. Yet, the DoD and other government agencies have mission-driven reasons to seek long-term research advantages in relevant technologies.

The Department must find a way to fund and execute long-term research and to leverage the strengths of government, industry, and the universities. This proposed new initiative calls for a three way partnership between the government, industry, and universities. Funds would be provided by both the government and industry to university centers. Government would ensure that research remained long-term in nature and mission-relevant. Industry would ensure that the research had promise for delivering commercially successful products.

This would provide a new mechanism to link universities (the long-term research performer) with industry (the short term product producer), doubling the level of industry investment in strategically directed research focus areas.

A test case is currently underway at the Defense Advanced Research Projects Agency in the area of advanced lithography. We anticipate industry matching funds will be forthcoming. This effort complements a National Science Foundation effort co-funded with industry.

NATO Cooperative R&D Program

In the post-Cold War world, the United States no longer faces a single galvanizing threat such as the former Soviet Union. Instead, there is increased likelihood of our forces being committed to limited regional military actions--coalition operations--in which allies are important partners. In this climate, the United States seeks armaments cooperation with its friends and allies for three reasons:

- The first reason is political: these programs help strengthen the connective tissue--the military and industrial relationships--that bind our nations in a strong security relationship;

- The second reason is military: there is a need to deploy forces with interoperable equipment and rationalized logistics in a coalition environment; and

- The third is economic: our defense budgets and those of our allies are shrinking--what we cannot afford individually may be affordable with a common effort.

To promote new cooperative arrangements, the FY 1997 budget request contains funding for NATO cooperative R&D programs. These programs have fielded significant new capabilities for U.S. and allied forces. For example, a NATO R&D cooperative effort transitioned into the F-16 mid-life update, which resulted in increased U.S.-European F-16 interoperability and $2 billion in international co-development. In another case, a $17 million investment in a NATO cooperative R&D program led to the successful integration of a new fire-control radar into the AV-8 Harrier for the Marine Corps, and $900 million in foreign sales for U.S. industry.

We have restructured the NATO R&D program for FY 1997 to better meet the current challenges facing the U.S. and its allies and to improve the management of this important program. Resources for the international programs have been integrated into the defense planning and budgeting process of the military departments. Funds are now requested in four program elements, one for defense-wide applications or new starts, and a separate program element for efforts transitioned to each military department.

Selection decisions for new projects will be made with the coordination of the responsible Service Acquisition Executive. Two important new projects envisioned for FY 1997 are: (1) Combat Identification to reduce likelihood of friendly fire casualties, and (2) International Command & Control Systems to enhance battlefield awareness. Both projects are directed towards improving the effectiveness of coalition operations with our allies. Finally, the CINCs are being consulted in the identification and approval of new cooperative projects.

Foreign Comparative Testing Program

The Foreign Comparative Testing (FCT) Program allows the Department to evaluate whether the defense equipment developed by our allies and other reliable

foreign sources can satisfy DoD requirements or correct mission area shortcomings. In cases where U.S. requirements are met, the Department is able to avoid development costs to meet a validated requirement. For example, a $10.5 million FCT evaluation of the Israeli-developed HAVE NAP Missile, allowed the United States to save $165 million in development costs and six years in development schedule.

The FCT Program has been an unqualified success. Since its inception, the United States has procured over $3 billion worth of non-developmental items (NDI) through the FCT Program. By the end of FY 1995, 341 FCT projects and 77 procurements were completed. In the process, the United States avoided the costs of new start developmental programs, realized cost savings due to foreign competition, fielded equipment rapidly, and created international industrial teaming opportunities for U.S. industry.

RDT&E INFRASTRUCTURE

Defense Laboratories

The Department has been reducing its extensive RDT&E infrastructure, including the defense laboratories, through the Base Realignment and Closure (BRAC) process. Significant consolidations of defense laboratory functions have already been made by the Department as a result of the base closures and realignments made in 1988 and the three implementation years of 1991, 1993, and 1995 associated with the Base Realignment and Closure Law of 1990. More consolidation is necessary and planned over the Department's Future Years Defense Program (FYDP).

In May 1996, the Department will report on the development of a comprehensive plan for its laboratories and test & evaluation centers in the 21st century. This plan will take about 18 months to develop and will be fully implemented, as required by the FY

1996 Defense Authorization Act, by October 1, 2005. It will provide an affordable, balanced blueprint for structuring our RDT&E organizations and sizing our RDT&E infrastructure to respond to the needs of the warfighter in a dynamic technological environment. The Department's vision for the defense laboratories will be based on three pillars: (1) Reduction, (2) Restructuring (to include cross-servicing), and (3) Reinvestment (for infrastructure modernization). The five year plan will lay out the Department's on-going process to look for new opportunities to tailor our laboratories to tomorrow's mission challenges.

The plan will build upon the previous reductions achieved through the BRAC process. It will be fully responsive to the provisions of the FY 1996 Defense Authorization Bill, Section 277, as well as to the President's NSTC guidance, doing so in an integrated way and as an element of the overall vision. The plan will seek Congressional bi-partisan support for the DoD RDT&E Infrastructure Vision 21 through passage of new enabling legislation.

DARPA

The Defense Advanced Research Project Agency (DARPA) FY 1997 budget request is $2.178 billion. This is 17 percent below the FY 1996 request, in nominal terms, and represents almost a five percent decline in real dollars from the FY 1996 appropriated level. It is a real decline of about 20 percent from the FY 1994 budget. This is an appropriate level of funding for the Agency.

DARPA's strategic investment is guided by the needs of the military warfighters overlayed by a technological vision. The Unified Commanders, the Chairman and the Joint Staff must focus on their immediate needs. The technologist, however, should take those needs and match them with technological capabilities to derive a vision for the military 20 years in the future. DARPA's investments are guided by such visions in

each of several militarily important areas. The Agency funds demonstrations of systems and component technologies and the underlying, long-term technology development necessary to make the visions a reality.

The objective is to provide the warfighter with the tools he needs to confront the uncertainties of the future battlefield and to dominate that battlefield. Among DARPA's top military priorities, areas where technology can make a difference to the warfighter, are: (1) biological warfare defense, (2) improved operations of small military units, and (3) battlefield dominance.

To expand a bit, biological warfare defense is unfortunately an area in which our nation is deficient. It is also an area that is easy for adversaries to exploit. DARPA plans a major effort to focus on those technological solutions that complement efforts ongoing elsewhere in the Department, particularly in the Army, concentrating on the high-risk end of advanced detectors, countermeasures and improved treatment options.

The warfighters, particularly the Marine Corps with their Sea Dragon concept, and to a lesser extent the Army with Force XXI, are pursuing concepts of operations that are ahead of technology in the area of small unit operations. This operational concept can exploit the technological strengths of the US, by using technology to provide the superior situational awareness, covert communications, precise navigation, and efficient logistics support that will enable small, dispersed forces to operate cohesively against much larger forces. DARPA is working closely with the Services, especially the Marine Corps, in this effort. The FY 1997 budget request for DARPA includes $52.7 million for this effort.

In a separate thrust, DARPA has refocused its activities to assist the warfighter in achieving the battlefield dominance so necessary for current and future joint warfare. This includes technologies and systems leading to comprehensive battlefield awareness,

which is the ability to know where everything is and what it is doing; and information integration, particularly near-real-time command, control, communications (C3), planning and replanning, to get data where it is needed and use it for real-time planning. This investment area includes ACTDs with direct warfighter participation and development programs in: data collection, exploitation, and dissemination; dynamic sensor management; C3 for the joint task force commander; air campaign planning and execution; and the communications infrastructure and shared data bases that support all of these tasks. These very significant efforts in support of the warfighters total $184.9 million and represent one of the major thrusts to exploit information technologies for military capabilities.

Also included in this battlefield dominance thrust is DARPA's continued investment in advanced distributed synthetic environments. These technologies are improving the military's ability to conduct realistic, cost-effective training of forces and joint task force commanders, allowing them to exercise their new battlefield dominance capabilities. We saw the fruits of this in Atlantic Resolve '94 and we are moving towards further demonstrations under Synthetic Theater of War 97.

One key part of the battlefield dominance equation is surveillance and data collection. DARPA and the Defense Airborne Reconnaissance Office (DARO) are working together on the High Altitude Endurance Unmanned Air Vehicle system, which consists of two complementary air vehicles. One, the Tier III Minus DarkStar, will soon fly for the first time. The other, Tier II Plus (Global Hawk), will finalize its design this spring, and first flight is scheduled for December 1996. DARPA's budget request includes $14.7 million for Tier III Minus; additional Tier III Minus and Tier II Plus funding is included in the DARO FY 1997 request.

In the area of naval warfare, DARPA is refocusing its programs to concentrate on advanced submarine technologies and on technologies for the Navy's exciting new

arsenal ship concept, with a request of $16.4 million for the latter. DARPA and the Navy will work together on this effort to provide a new paradigm for Navy shipbuilding and to achieve lower costs and greatly reduced manning levels.

DARPA has been active in the area of micro-electromechanical systems (MEMS) for 4 years, and plans to continue its investment in this area, requesting $54.8 million for FY 1997 efforts. MEMS holds exciting possibilities for revolutionizing a myriad of military systems ranging from miniature inertial measurement units for munitions and personal navigation, distributed unattended sensors, non-invasive biomedical sensors and distributed aerodynamic control. The Department's investment in this technology will position the military to take advantage of new applications as they become known.

A second interesting enabling technology that warrants increased investment is the area of high energy-density power sources such as small highly efficient batteries, self-sustaining fuel cells, and mini-turbine engines. These technologies are particularly applicable to tomorrow's highly mobile, information-intense environment. In addition, the combination of mini-turbine engines and MEMS devices hold promise for a variety of futuristic, tiny systems, such as micro-unmanned air vehicles and human-portable cooling systems.

DARPA continues to support long-term funding in those critical technologies underpining the 20-year military visions. Information technologies are obviously key to many of the capabilities needed by the future warfighter, especially technologies for robust, massive, mobile information networks applicable to the military in the field, and technology to make information systems easier to use and more useful. In FY 1997 and future years, DARPA plans to expand its emphasis on the difficult problem of information survivability.

DoD-Sponsored R&D Centers

The Department has strengthened its management of Federally-Funded Research and Development Centers (FFRDCs) and University-Affiliated Research Centers (UARCs) to ensure the most effective and prudent use of the centers while providing measures to guard against abuse. The work content and the operations of each of these centers have been closely scrutinized over the past year. FFRDCs and UARCs are sized consistent with essential sponsor requirements, acquisition reform initiatives, and defense strategies and budgets.

We have strengthened our management controls, including managing the workload of our centers to the core concept; transitioning on-going work that is non-core out of the centers; and establishing consistent management fee guidelines. We have established new, stringent criteria for the performance of non-FFRDC work by the parent corporation of an FFRDC. And finally, we have established an "Independent Advisory Group" of highly respected people from outside the Government to independently assess the adequacy of on-going DoD management actions.

In summary, the Department has responded to the legitimate concerns of the Congress. We have implemented needed management reforms and it is now time to restore the normal process for fiscal oversight of FFRDCs and UARCs. Accordingly, we are requesting the four defense oversight committees to discontinue the practice--started a few years ago--of inserting special language in annual authorization and appropriation bills to limit DoD spending at FFRDCs. Such measures are no longer needed and they unnecessarily constrain DoD's ability to effectively and efficiently use FFRDCs for appropriate national security tasks.

Test & Evaluation Centers

The Department's Test and Evaluation (T&E) infrastructure contains some of the most technically advanced and complex facilities in the world and provides critical support to our weapons system development programs. Our major facilities are managed under a Department-wide Major Range and Test Facility Base (MRTFB) directive to satisfy the needs of all the military Services and defense agencies--not just the Service or component that operates the facilities. This structure provides a basis for minimizing unnecessary redundancy.

In FY 1997, the institutional funding for operating the MRTFB facilities amounts to about $1 billion or about 3 percent of the Department's RDT&E budget and about one and half percent of the total funding for DoD infrastructure. The military and civilian workforce at these facilities account for slightly more than one percent of the Department's military and civilian workforce. At some MRTFB centers, government personnel comprise only a small fraction of the workforce, but, on the average, they comprise a little less than 60 percent of the workforce at the RDT&E funded MRTFB activities. The remaining 43 percent of the workforce is composed of contractor personnel.

The funding and workforce for the Department's T&E centers have been on a downward slope since about 1987. This downsizing trend has lagged overall changes in the defense budget, but has been tracking with the needs of our major weapons development programs as they enter their test & evaluation phases. Some examples of our major consolidation actions include: the closure of Jefferson Proving Ground and consolidation of its workload to Yuma Proving Ground; relocation of the 4950th Test Wing at Wright-Patterson Air Force Base to the Air Force Flight Test Center; and the closing of the Navy's Turbine Engine test facilities at Trenton, New Jersey and consolidation of all aircraft engine altitude testing capability at the Arnold Engineering Development Center in Tennessee.

From 1990 to 1997, the Department has reduced the test center workforce by more than 9,000 people. While the marginal workload at the test centers has remained high-primarily due to the progression of major weapon system development efforts into their test & evaluation phase, the institutional (open-the-door) workforce and funding have declined significantly since 1990. From 1990 to 1997, the institutional workforce will decline 27 percent with an additional decline of 12 percent programmed by FY 2001. The workforce associated with user funded workload is expected to decline 20 percent from 1990 to 1997 and another eight percent by FY 2001.

ACQUISITION PROCESS IMPROVEMENTS

A big assumption in our defense planning is that we will get significant savings by overhauling our defense acquisition system. The idea here is to be more efficient in what we buy; how we buy it; and how we oversee that buying process. As I look at the defense acquisition system in detail, what I find is that the system is not broken--it fields equipment that is second to none in the world. But I believe that the system can and must operate much more efficiently.

Although the new federal acquisition streamlining regulations will help the Department use commercial procurement procedures, we know that the principal problems are not statutory or regulatory. There is considerable freedom in our acquisition statutes and regulations. The issue is really cultural. We have become so risk averse that it seems like we end up spending billions to make sure we do not lose millions. We have set up a structure that discourages risk taking--it settles for very, very conservative performance at all levels. We are moving now to try to adjust that culture. To make a cultural change, we need the appropriate incentives to adjust the behavior of our acquisition work force.

On February 9, 1994, Secretary Perry provided the then House Armed Services Committee, and on February 24, 1994, both the Senate Armed Services and Governmental Affairs committees, his plan for acquisition reform within the Department of Defense entitled, "Acquisition Reform: A Mandate for Change." On March 15, 1994, Secretary Perry issued a policy memorandum implementing "A Mandate for Change" within the Department. Today, I am pleased to provide a status report on the progress we have made in implementing the reforms identified in "A Mandate for Change."

Implementation of Legislative Reforms

One of the major efforts identified in the "Mandate for Change" was leveraging the recommendations of the Section 800 Panel. As a result of a true bi-partisan partnership, the Congress enacted two landmark pieces of legislation, the Federal Acquisition Streamlining Act of 1994 and the Federal Acquisition Reform Act of 1996. DoD, working with the Administrator of the Office of Federal Procurement Policy (OFPP) and other federal agencies, is in varying stages of implementing both pieces of legislation.

Federal Acquisition Streamlining Act (FASA)

FASA provided the Department with much needed relief in a number of key areas. First, it provided streamlining in the area of low dollar, relatively low risk procurements by setting the Simplified Acquisition Threshold, or SAT, at $100,000 and by exempting purchases at or below the SAT from 13 statutes. This legislation also provided us with flexibility in the purchase of commercial items, exempting them from the application of a number of statutes which prevented us in many cases from buying those items in the commercial marketplace.

Equally important was the relief FASA provided from the application of the Truth in Negotiations Act (TINA). FASA gave the Department the flexibility to obtain cost or pricing data where the risk associated with the procurement merits, while at the same time clearly setting forth the circumstances where cost or pricing data is not normally required. Last, and certainly not least, was the authority to implement five Pilot Programs.

The vast majority of FASA provisions were implemented prior to October 1, 1995. Between December 1994 and October 1995, the Department supported publication of 23 rules, which changed 1328 pages or 71 percent of the Federal Acquisition Regulation. This was accomplished using multi-functional teams drawn from throughout the federal government. As a result of the public comments received thus far, we are in the process of looking at a number of issues including: the reorganization of FAR Part 13; whether our new commercial rule in FAR Part 12 can be used for construction; and how to amend existing contracts to take advantage of FASA changes.

There are also a few difficult issues associated with the implementation FASA which we have not been able to resolve. Those issues are: (1) the rule on travel costs; (2) implementation of multiyear provisions; and (3) small disadvantaged business coverage. These issues have proved to be very difficult for a number of reasons. In the case of small disadvantaged business coverage, a major factor has been the impact of the Supreme Court's decision in Adarand. The Department is working closely with the Administrator of the OFPP to resolve these outstanding issues.

Federal Acquisition Reform Act (FARA)

FARA provides the Department with very important statutory relief as well. The consolidation of the review of protests at the General Accounting Office was a major

step in establishing a single standard of review for protests. Similarly, the decentralization of procurement authority for information technology provides the opportunity to purchase information technology in a way which is more efficient and more closely meets the Department's requirements. It also provides additional authority in the area of buying commercial products through use of Simplified Acquisition Procedures for commercial items purchases up to $5 million and through more clearly defining what constitutes a commercial item.

FARA implementation has just begun. One of the issues we are reviewing is how best to involve industry in the implementation process. During FASA implementation, industry participation and guidance on rules implementation was solicited through a series of public meetings. For the record, I would like to take this opportunity to thank the industry associations which participated with us in the FASA implementation effort. Industry has encouraged us, and we are exploring ways, to further improve the process in which the Department involves industry in the development of FARA implementation policy.

Streamlined Acquisition Oversight

We are beginning to achieve real success in implementing a bold, new, reengineered oversight and review process that will better serve our warfighters and conserve public funds. Our approach is to shift from "after-the-fact oversight" to "early-and-continuous insight." A new Overarching and Working-Level Integrated Product Team (OIPT-WIPT) process, the foundation of our newly revised DoD Instruction 5000.2, is focused on developing program strategies and plans that are affordable and executable.

This oversight process facilitates identifying and resolving issues in a more timely manner; keeping programs on track; and providing the warfighter what he

needs, when he needs it, and at an affordable cost. While this process is relatively new, there are visible signs of success. For example, the cycle time for acquisition decision memorandums which averaged 23 days in 1994, was down to two days in 1995. More importantly, 18 of 26 scheduled Defense Acquisition Board (DAB) reviews in 1995 were not held—"paper-DABs" sufficed in these cases because all the major issues were resolved without the need for a formal DAB meeting.

Paperless Contracting

The Department has made great strides towards implementing a paperless contracting environment over the past year. Our approach included identifying the 240 contracting offices which execute 80 percent of the contract actions initiated by the Department annually. Over the past year, the Department has developed and begun implementing a plan to fully automate these high volume offices, and to date, over half of these offices have been fully automated. Our future plans include expanding a paperless automation environment to all facets of the acquisition process. The goal is to link the customer, the logistics systems, the procurement system, and the financial system in a seamless web.

Military Specifications Reform

We have effectively turned our procurement system on its head with respect to military specifications and standards. A program manager in the past had to get a waiver in order to use commercial and performance standards. Now the reverse is true. If a program manager wants to use military specifications, then he has to get a waiver in order to justify the extra cost entailed in military specifications.

As part of our effort to maximize utilization of both commercial products and practices, Secretary Perry issued guidance in June 1994 that changed the focus on the

way in which we describe our requirements and reduced the number of occasions in which design-specific military specifications and standards are to be used. Our focus is to describe our requirements in terms of the performance needed, thus providing greater reliance on commercial and dual use technologies.

We have reviewed all of our 30,000 specifications and standards, eliminating 2600 of them to date. We are continuing to implement the decisions on these documents. It is important to note that our policy is not one of "zero tolerance." Military specifications will continue to be used in some cases, such as to define interfaces and ensure safety. In these cases, however, we still want to make sure that the documents are current and include current technology.

Single Process Initiative

The Single Process Initiative is one of our newest reform initiatives. It implements the "A Mandate for Change" guidance to adopt commercial practices where we can on existing contracts. This initiative addresses a very real problem. Currently in many of our contractor's facilities, there are different processes imposed to manufacture similar product lines. For example, a contractor has one manufacturing process for his commercial customers and a different one imposed by the Defense Department.

In just one factory, a defense contractor was forced to use eight different soldering specifications--five for the government and three for commercial clients purchasing similar types of products. This meant the workers had to be trained on all eight soldering and inspection techniques. It also meant that the contractor had to maintain eight different types of production documentation. This cost him more. In turn, he passed those costs on to us. That is fair, but it is expensive. It is expensive for the Department and the taxpayer.

With this initiative--starting on existing contracts--we will reduce the number of processes used. We are seeking to modify the contracts as a 'block', not simply contract by contract. For most contracts that we have in place, there will be bilateral cost avoidance--that is, the savings will be passed directly to the government; and, in the end, to the taxpayer. This occurs on cost-reimbursable contracts and cases where we have priced options that can be renegotiated. In the case of longer term fixed-price contracts, there is a possibility of what I would describe as unilateral cost avoidance--savings would be realized by the contractor but the contract's fixed-price structure has no mechanism to automatically pass along these savings to the government. In these unilateral cases, we would seek consideration and make adjustments to the contract prices.

This initiative is being implemented on a expedited basis. We will not spend months having detailed cost proposals prepared, audited and negotiated unless the initial review by an administrative contracting officer indicates that the possibility exists for substantial unilateral savings after the contractor transition costs and the government administration costs are considered. We expect the number of these unilateral savings cases to be few. This initiative has been embraced by industry. The Defense Contract Management Command has received over two dozen concept papers and several hundred inquiries.

Defense Acquisition Pilot Programs

The Department has recently reported significant progress by the Defense Acquisition Pilot Programs (DAPPs) in implementing regulatory and statutory acquisition reform and in achieving significant cost and schedule benefits from 15 to 50 percent. The five programs, which were nominated as pilots by DoD in December 1994 and designated under the provisions of the Federal Acquisition Streamlining Act of

1994, are the Joint Direct Attack Munitions (JDAM), Fire Support Combined Arms Tactical Trainer (FSCATT), Joint Primary Aircraft Training Systems (JPATS), Commercial Derivative Engine (CDE) and the Non-Developmental Airlift Aircraft (NDAA).

The DoD Pilot Program Consulting Group (PPCG) was tasked to assist the DAPPs in evaluating the benefits of approved regulatory and statutory relief, through the development of focused metrics and appropriate baselines. In its 1995 report, the PPCG reported significant gains in efficiencies as a result of reductions in the use of military standards, contract data requirements, solicitation length and complexity, and source selection cycle time.

The JDAM program, for example, projects a 34 percent reduction in development time and a unit cost savings of over 50 percent with an associated total production cost avoidance of $2.9 billion. The JDAM program office attributes these dramatic savings to the commercial-style environment created by FASA. The JDAM program manager capitalized on the "commercial environment" to procure proven technology with reduced oversight (an average 85 percent reduction in in-plant oversight) and streamlined procurement documentation (29 data requirements and a two-page statement of work with only interface specifications and no military standards).

The Army's FSCATT program manager also reports significant cost and schedule benefits. Streamlined procurement efforts completely eliminated unique military standards, while reducing data requirements from 56 to seven. In-house source selection hours were slashed by 30 percent. Development time and costs were reduced by 33 and 34 percent respectively. In addition, the innovative use of commercial-style milestone billing on this program is expected to significantly reduce contract administration costs.

JPATS acquisition reform initiatives enabled a 50 percent reduction in military standards and a 60 percent reduction in contract data requirements. These efforts resulted in a reported 12 percent reduction in development time and a 50 percent savings in program office staffing.

McDonnell Douglas quickly responded to the NDAA competition (and DoD should-cost efforts) by aggressively attacking cost drivers, resulting in a 25 percent reduction in projected C-17 costs. The recent milestone decision to purchase 80 additional C-17s, in lieu of the NDAA, reflects the benefits of the commercial-style NDAA competition. In addition, a further $896 million savings is anticipated as a result of a proposed C-17 multiyear procurement.

ACQUISITION WORKFORCE

The Department's acquisition workforce peaked in FY 1989. In the six year period from June of 1989 to June 1995, the Department reduced the number of personnel employed in acquisition organizations by 30 percent, or 187,012 people. Our projections, using estimates contained in the President's FY 1997 Budget Request, indicate the Department will reduce the number of personnel in these organizations another 67,173 by FY 2001. This carefully managed and controlled drawdown will yield an overall 40 percent personnel reduction in FY 2001 when compared to the FY 1989 level, and a 30 percent reduction over the FY 1980 level.

FY 1997 BUDGET REQUEST

We have made very tough choices because of the need to balance the federal budget and the resultant budget top line for defense. The President's FY 1997 budget request contains $34.7 billion for RDT&E and $38.9 billion for Procurement. FY 1997 represents a transition year as we continue a modest reduction of RDT&E towards more

sustainable levels. We continue to emphasize Science and Technology funding to assure future warfighting superiority.

SUMMARY

Mr. Chairman, every weapon system in the U.S. inventory today required decades of direct investment in critical enabling technologies. These systems exist because of the technologies and concepts developed by teams of dedicated researchers at our universities, defense laboratories, test centers and industrial contractors. The DOD is committed to maintaining a legacy of technological supremacy at an affordable cost. The Department's FY 1997 budget submission contains a prudent and relevant mix of defense technology investments. This program is needed to produce a robust set of innovative technology options for tomorrow's weapon systems. It secures the Department's long-term modernization strategy; meets the national security needs of the nation; and preserves a legacy of technological superiority for U.S. forces in the 21st Century. I thank you for this opportunity to appear before the Subcommittee and shall be happy to answer any questions you may have.

Statement of

The Under Secretary of Defense for Acquisition and Technology
Honorable Paul G. Kaminski

Before the
Senate Committee on Armed Services

on

Ballistic Missile Defense

March 6, 1996

Mr. Chairman, members of the committee, and staff, thank you for the opportunity to appear before you today to discuss the specifics of the Department's Ballistic Missile Defense (BMD) strategy. For all of our adult lives, most Americans have lived with a dark cloud hanging over our heads--the horrific threat of a nuclear war that would end our way of life and civilization as we know it. Now, with the end of the Cold War, that dark cloud is beginning to drift away. The whole world is breathing a little easier.

But that cloud is not yet gone. The world's nuclear powers still hold thousands of nuclear weapons, along with many hundreds of missiles to deliver them. And many other countries, some of them rogue nations to which the calculus of deterrence does not apply in the same way, are acquiring the means to deliver weapons of mass destruction--nuclear, biological, and chemical. Many of these nations have obtained ballistic missiles--short-range ballistic missiles--and some are in the process of acquiring longer-range ballistic missiles.

The proliferation of short-range ballistic missiles in the world today poses a direct, immediate threat to many of our allies and to some U.S. forces deployed abroad in defense of our national interests. Over time, the proliferation of longer range missiles

will pose a greater threat to the U.S. itself. For these reasons, active defenses are playing a central and vital role in U.S. defense planning well into the next century. The resource-constrained environment of the nineties, together with the complex nature of the security challenges facing us, necessitate that we deploy the right capabilities at the right time for achieving the highest overall level of security for the United States.

To do so we must consider the role of missile defense within the nation's broader national security strategy. Active defenses can never be considered in and of themselves a panacea for countering the proliferation of ballistic missiles and weapons of mass destruction. We have a broader strategy encompassing a full range of tools in a national "kit" of options. Our strategy has three different components: preventing and reducing the threat; deterring the threat; and defending against the threat.

For example, we have adopted the Non-Proliferation Treaty, the Framework Agreement with North Korea, the INF Treaty, the MTCR, and export controls as ways of preventing or reducing the threat to our allies and U.S. forces deployed abroad. The threat to the United States has been reduced significantly through the START treaty, and it will be reduced even further through the START II treaty if Russia ratifies it. Additionally, we have an extensive program for actually dismantling the warheads and the missiles that had been directed against us in a Cooperative Threat Reduction (CTR) program supported by Nunn-Lugar funds. This is our first line of defense against ballistic missiles and weapons of mass destruction--preventing and reducing that threat.

The second line of defense is deterrence. In the case of the long-range missile threat to the United States, either from land based Intercontinental Ballistic Missiles (ICBMs) or submarine-launched ballistic missiles (SLBMs), our strategic nuclear forces have been a bulwark of deterrence for nearly a half-century. That will continue. We have smaller nuclear forces now than we did a decade ago, but they are still very

powerful and quite capable of carrying out the strategic deterrence mission. In the case of deterring short-range missile threats, our theater nuclear forces and very powerful conventional forces provide some level of deterrence against limited nuclear attacks.

To the extent that these first two components, reducing the threat and deterring the threat, are not fully successful, we have to be prepared to defend directly against a threat. In the case of the strategic threat to the United States from rogue states or from accidental/unauthorized launch, the National Missile Defense (NMD) program is America's ultimate insurance policy. For our deployed forces, we are developing and fielding both lower-tier and upper-tier theater missile defenses to counter regionally-oriented missile attacks.

THE THREAT

The theater threat to our allies and U.S. forces deployed abroad is real and growing. We saw it demonstrated in the Gulf War. Besides Iraq, we know there are many ballistic and cruise missiles in many countries. Many thousands of short-range missiles are deployed today with hundreds of launchers in as many as 30 different countries--some of these countries are quite hostile to the United States. This threat is here and now. It is widely dispersed, and it has to be taken very seriously.

In addition to the short-range missile threat, we see a medium-range threat emerging. Some nations are developing their own medium-range missiles; in particular, North Korea is developing the No Dong missile. Other nations, some of them rogue, are buying these missiles or trying to buy them. Iran is a case in point.

In addition to missiles with conventional warheads, we have a threat today from missiles armed with chemical and biological warheads. We now know what we

suspected during Desert Storm--Iraq had chemical warheads that could have been put on Scud missiles. It is still an open question as to why Iraq did not use them during that war. Our strategy for deterring the use of weapons of mass destruction appears to have worked, possibly because they feared an overwhelming response from our conventional forces, or possibly a response with nuclear weapons. Whatever the reason, we do know that that chemical threat existed and the Iraqis were deterred from using those weapons.

We believe that Iran, North Korea, and Libya all have extensive chemical weapon programs. In addition, we anticipate a nuclear threat being possible in the future. We know, in retrospect, that Iraq was very close to a nuclear operational capability at the time they started the Gulf War--fortunately, they were not all the way there. We know that North Korea was close last year. But their program is now stopped by the Framework Agreement. And we understand that Iran is working to achieve a nuclear weapons capability, but we believe they are many years away. We will keep a close eye on the nuclear threat from so-called rogue nations armed with theater ballistic missiles.

In the case of strategic missiles, Russia and China have a significant capability for delivering these weapons with strategic weapon delivery systems--land-based and submarine-launched missiles and long-range aircraft. We do not see these systems as posing a threat to the United States in the foreseeable future. That is, we do not see an intent that goes with the capability. Even should that situation change, we will continue to field a significant U.S. deterrent force.

We do not see a near-term ballistic missile threat to U.S. territory from the so-called rogue nations, but we cannot be complacent about this assessment. However, the threat of long-range missiles from rogue nations could emerge in the future. The

Intelligence Community estimates that this threat would take 15 years to develop, but could be accelerated if those nations acquired this capability from beyond their borders. This is why our counter-proliferation programs are important and why the role of missile defense within this broader national strategy must be carefully integrated into U.S. defense planning.

BMD PROGRAM REVIEW

Over the last year, the Department's missile defense programs have been criticized from two different directions. Some members of Congress have criticized the Department for spending too much money on missile defense; others believe we are not spending enough. Some have criticized the Department because we are moving the programs too quickly. Some think we are not moving the programs quickly enough.

The Joint Requirements Oversight Council (JROC) criticized the Department's Ballistic Missile Defense programs from two different points of view. First, our BMD program was funded at a level too high compared to other higher-priority, pressing modernization and re-capitalization needs. Second, we were not focused sharply enough on dealing with the here-and-now threat.

With all of this criticism, some of it appropriate, the Secretary of Defense decided we needed to look intensively into the Department's whole set of missile defense programs and look for a restructuring of the program portfolio to produce a source of funds for other modernization priorities. During the past several months, we have identified what I believe is a more balanced missile defense program, one that is more affordable, and one that has better prospects for successful execution. It is also better matched to the missile threats we will be facing. This new plan makes use of all of the

funds that were appropriated in fiscal year 1996 for missile defense--both the funds that were requested by the President, as well as the funds that were added by the Congress.

Our review reaffirmed the fundamental priorities in our missile defense program. The first priority is to defend against theater ballistic missiles and cruise missiles. Within the theater missile defense (TMD) mission area, the review broke some new ground on defining the underlying sub-priorities. The first sub-priority is to field systems to defend against the existing short-to-medium-range missiles--our lower-tier TMD systems. The next sub-priority is to proceed at a prudent pace to add wide area defenses and defenses against the longer-range theater missiles as that threat emerges--the upper-tier TMD systems.

Our second priority is to develop a capability to defend against Intercontinental Ballistic Missiles--our National Missile Defense program--and the cruise missiles which may threaten the United States in the future.

Finally, our third priority is developing a robust technology base to underlie these two programs---both the TMD program and the NMD program--to be able to develop and deploy more advanced missile defense systems over time as the threat systems they must counter become more advanced.

THEATER MISSILE DEFENSE

We dealt with our number one priority--Theater Missile Defense--by first assessing the situation in the theater today. Two systems are fielded--the Marine Corps Hawk system and the Patriot Advanced Capability (PAC) 2/Guidance Enhanced Missile (GEM) system. The Hawk capability is very limited. The PAC-2/GEM system

contains a guidance upgrade that significantly improves the lethality and coverage of the basic PAC-2 system used in combat during Desert Storm.

Although the PAC-2/GEM system provides a more robust capability than that which we had fielded in Desert Storm, it is still not sufficiently robust capability to deal with the threat. The program that emerged from our review and that was incorporated in the fiscal year 1997 budget request reflects the Department's commitment to put "rubber on the ramp" for these TMD systems for which the threat has already emerged.

Lower-Tier Systems

Our first theater missile defense priority is to enhance the capability of our lower-tier systems beyond that we now have deployed. Our intent is to strengthen our effort to field a capability to defeat short-to-medium-range theater ballistic missiles as soon as possible.

We will do this by building on existing infrastructure and prior investments in on-going programs; expanding the capability of Patriot and Aegis/Standard Missile systems; and improving our Battle Management/Command, Control and Communications (BM/C3) capability. We are also beginning, in a cooperative program with our allies, the Project Definition/Validation phase of the Medium Extended Air Defense System (MEADS), a highly mobile system intended to provide our maneuvering forces with a 360-degree capability against both ballistic and cruise missiles.

We have two systems, the PAC-3 and the Navy Area Defense (NAD) system, in development to give us our core lower-tier capability. Neither of these programs involves a significant technology risk at this point. The risks ahead for these programs

are related to program execution. Our task is to ensure that we have a robust program to proceed with both systems and to field this capability as early as possible. The mix of PAC-3 and Standard Missile-2 Block IVA interceptors eventually purchased to perform the lower-tier mission will depend on their relative prices and performance, and the threat.

PAC-3

The first of the advanced lower-tier systems to be fielded is the PAC-3. It is a much more capable derivative of the PAC-2/GEM system in terms of both coverage and lethality. The PAC-3, in fact, has a new interceptor missile with a different kill mechanism--rather than having an exploding warhead, it is a hit-to-kill system. During the review, we found that the PAC-3 program had a high degree of risk for completion. There were some fact of life slips in the schedule, and the program was not funded at a level commensurate with our near term priority to field a robust capability.

Even though a major objective of the review was to reduce the missile defense budget, we added about $240 million for the PAC-3 through the Future Years Defense Program (FYDP) and established a realistic schedule to lower the program execution risk by extending the engineering and manufacturing development (EMD) phase of the program by up to ten months. System performance will be improved by re-phasing the missile and radar procurements; upgrading four launchers per battery with Enhanced Launcher Electronics Systems; and extending the battery's remote launch capability.

We also looked at fielding the PAC-3 system. We had originally planned to upgrade nine missile defense battalions with the PAC-3 system. We decided, instead, to defer the upgrade of three battalions pending availability of the Medium Extended Air Defense System (MEADS). PAC-3 Low Rate Initial Production (LRIP) will begin in the

first quarter of fiscal year 1998, and the First Unit Equipped (FUE) date is planned for the fourth quarter of fiscal year 1999.

Navy Area Defense

The second of the lower-tier systems, the Navy Area Defense (NAD) system, consists of Standard Missile-2 Block IVA interceptors deployed aboard Aegis ships. The capability provided by this system has the advantage of being able to be brought into theater without having forces on land.

Although to a lesser degree than PAC-3, we found similar executability risks in this program. We will use the $45 million added by Congress in the fiscal year 1996 appropriation to compensate for system engineering and design efforts not fully funded in fiscal year 1995. We also added about $120 million to this program through the FYDP to make the program fully executable on a moderate risk profile. These funds will cover delays in risk reduction flights and adjusted cost estimates for test targets and lethality efforts. This will allow us to proceed expeditiously with the EMD program and LRIP missile procurement.

The program plans provide for fielding a User Operational Evaluation System (UOES) capability in fiscal year 2000 and a first unit equipage in fiscal year 2002. Thereafter, operational units will use the legacy UOES system for continued testing and as a contingency warfighting capability. This will maintain our baseline development and procurement schedules for the program.

MEADS

The last of the lower-tier systems is the Medium Extended Air Defense System (MEADS), formerly the Corps SAM program. This system will provide fundamental

enhancements in flexibility, mobility and deployability. For example, the PAC-3 system is oriented in a particular threat direction. MEADS provides 360 degrees of coverage. It is a highly mobile system that is designed to be deployed with our forward and maneuvering forces. It will be transportable on C-130 aircraft. MEADS will provide advanced capabilities against theater ballistic missiles, cruise missiles, and other air-breathing threats. This system would replace Hawk, and would ultimately replace Patriot. As discussed above, we are holding equipage of three Patriot battalions in reserve pending a decision on development and deployment of this MEADS system.

We are cooperating on this program with Germany, France, and Italy, who together will provide 50 percent of the funds. I soon expect to sign a Memorandum of Understanding (MOU) with our international partners to begin the next phase of this program. We added about $80 million over the FYDP to fully fund the U.S. share of the cooperative Project Definition/Validation phase. This increase brings our funding to a rate of about $30 million per year and fulfills our international commitments at this time. We will make a decision to enter development in fiscal year 1998.

Upper-Tier Systems

Our second theater missile defense priority is the upper-tier systems. These systems are necessary to defeat longer-range ballistic missiles, to defend larger areas, and to increase effectiveness against weapons of mass destruction.

The Department's plan for upper-tier systems contains the development of the Theater High-Altitude Area Defense (THAAD) system for our ground forces. In addition, our upper-tier approach moves the Navy Theater Wide (NTW) System from the status of advanced capability exploration to system assessment and demonstration.

THAAD

The THAAD system will provide extended coverage for a greater diversity and dispersion of forces and the capability to protect population centers. But the principal additional capability provided by this system is the ability to deal with our longer-range theater missile threats as they begin to evolve and emerge over time. THAAD also reduces the number of missiles that the lower-tier systems must engage and provides us with a shoot-look-shoot capability--the ability to engage incoming missiles more efficiently.

THAAD is the most mature upper-tier system. We were funding this program at about $900 million per year going into this review. We have made a significant adjustment to this program, keeping on track our capability for early contingency deployment of the system, but making out-year adjustments to focus on the nearer-term threat, reduce technical risk and lower the rate of investment.

We conducted believe it was important to keep in place the UOES concept and schedule. This provides us with the capability for a limited contingency deployment of the THAAD system in fiscal year 1998 to counter a near-term threat. This would include about 40 missiles and two radars, which would be used for user testing, but which could be maintained in the theater if required.

We made a conscious decision to keep the UOES portion of the program on track, but we restructured the rest of the program for the objective THAAD system, taking about $2 billion out of what was a $4.7 billion program through the FYDP. This restructured THAAD program is still funded at a level above the "critical mass" required to maintain a productive contractor team.

The system to be initially developed and deployed will be with the "UOES+", a better version of the UOES system, in lieu of the previously planned full-capability objective system for the THAAD program. We applied our cost-as-an-independent-variable (CAIV) approach to look at the enhancements for the objective system, what they cost and what they bought us. We concluded that the UOES+ will meet the most important THAAD requirements at a substantially reduced cost.

The UOES+ program will militarize the UOES design and upgrade certain components, such as the infrared seeker, the radar, and the BM/C3. This program delays the production ramp-up and first unit equipage by a little over two years. We will begin LRIP in fiscal year 2002.

NTW

The Navy Theater Wide system is projected to add the same generic kind of terminal coverage capability as the THAAD system, again providing longer range coverage and protecting a wider area. This system also offers ascent-phase intercept capability in cases where the Aegis ship can be positioned near the launch point, and between the launch point and the target area.

The Navy Theater Wide system is less mature than the THAAD system. Prior to the review, we were proposing funding this program in our fiscal year 1996 and 1997 budgets at a low level ($30 million per year) to mature the key enabling technologies. The fiscal year 1996 appropriation added $170 million to our request of $30 million.

We considered a number of approaches to the Navy Theater Wide system, ranging from the program proposed in fiscal year 1996 President's Budget, to a full

commitment to a major new start with $200 million applied in fiscal year 1996. The recommended program begins technology demonstration and concept definition starting in fiscal year 1996.

This recommendation was based on the lower priority of the upper-tier, lack of maturity of the technology, and the need to further develop the system concept to enhance robustness. There is also the opportunity to apply technology being developed for national missile defense to the NTW system. Likely areas of technology synergy include advanced sensors and seeker, propulsion, stabilization, and the underlying phenomenology.

We plan to apply the $170 million added in the fiscal year 1996 appropriation over a two-year period, as well as adding about $570 million through the FYDP.

Boost-Phase Intercept

We considered several approaches for fielding a Boost-Phase Intercept (BPI) capability against theater ballistic missiles. Obviously, it is desirable, if possible, to intercept an enemy missile while it is still boosting. The fiscal year 1997 budget request funds two primary BPI approaches. The Air Force has funded an Airborne Laser demonstration at about $775 million over the FYDP and expects to conduct several key engineering tests in fiscal year 1998. In parallel, the Ballistic Missile Defense Organization (BMDO) will fund concept definition studies to refine the concept for an Unmanned Aerial Vehicle (UAV) with a kinetic energy interceptor at a rate of $10 million per year in fiscal years 1997 and 1998. This level of investment is sufficient to refine the concept and support a back-up path should problems develop with the airborne laser demonstration. A decision on the best approach to fielding a BPI capability will be made in fiscal year 1998.

BM/C3

Interoperability in BM/C3 is essential for successful TMD operations. A capable, joint, interoperable BM/C3 underlies the three pillars of TMD, improving the effectiveness of active defense, passive defense, and attack operations.

We are actively pursuing three avenues to ensure effective BM/C3. These are: improving early warning and dissemination, ensuring communications interoperability, and upgrading command and control centers for TMD functions. From the joint perspective, the BMDO oversees the various independent weapon system developments and provides guidance, standards, equipment and system integration and analysis to integrate the multitude of sensors, interceptors, and tactical command centers into a joint, theater-wide TMD architecture. The BMDO also conducts tests and demonstrations with the Commanders-in-Chiefs (CINCs) to verify this architecture meets the requirements and supports the warfighters' needs.

These BM/C3 initiatives provide several benefits to active defense. Effective BM/C3 conserves the number of interceptors required by improving weapon system fire distribution and coordination and through sensor fusion. It provides multiple information paths between sensors, shooters, and control locations to combat sensor outages and jamming. BM/C3 weapon cueing information also increases battlespace and depth of fire, improves defense against long-range threats, and increases the defended area. For attack operations, BM/C3 helps locate the threat and improve probability to shooting the shooter first. BM/C3 also supports passive defense measures by providing greater early warning and faster reaction times.

This integrated BM/C3 architecture also sets a foundation for other BM/C3 intensive initiatives, such as cruise missile defense. Finally, the improvements to the

architecture, procedures, and interoperability pay direct dividends in all warfighting areas.

The Department plans to spend about $200 million per year on enhancements to the battle management/command, control and communications (BM/C3) capabilities of our theater missile defense forces. This amount includes "embedded funding" in the Patriot and Aegis programs. It also covers the amount required for the Department's TMD C3 core programs, such as the ADA Brigade Upgrades; JTIDS procurement and TBM platform integration; datalink standards; Combat Information Center (CIC) upgrades; and TIBS/TDDS integration.

NATIONAL MISSILE DEFENSE

The Department's second overall missile defense priority is National Missile Defense. Our intended program is to position the United States to respond to a strategic missile threat as it emerges. Because there is no threat that warrants it, we have made a decision not to commit to deploy a NMD system today. But we are shifting our national missile defense emphasis from a technology readiness program to a deployment readiness program.

Secretary Perry in his testimony last year described a "three plus three" program under consideration by the Department at that time. By moving from a technology to a deployment readiness posture, we have made the decision to proceed with the first three years of the "three plus three" program that Secretary Perry described. Under this approach, we plan to develop and begin testing elements of an initial NMD system and preserve thereafter a capability to deploy within three years. If after three years we encounter a threat situation that warrants a deployment, then an initial operational capability (IOC) for a NMD system could be achieved in another three years, by 2003.

To implement this approach, the Department plans to spend the additional $375 million added by the Congress in the fiscal year 1996 appropriation over two years to initiate the NMD deployment readiness program. As a result, we will be spending more on NMD early in the 1996-2001 FYDP and less later. We have increased our budget in NMD by about $100 million per year in both 1997 and 1998. We plan to reduce our funding for NMD by a commensurate amount in the out years of the FYDP--so the net change for NMD funding over the 1997-2001 FYDP ends up being about zero. Once the NMD technology base is built up over the next three years, the NMD deployment readiness posture can be sustained at a reduced funding level.

This approach enhances the technological foundation of our NMD program in two ways: (1) the performance of the National Missile Defense we would deploy will be considerably improved over time; and (2) the timeliness of response to field an operational capability to counter an emerging threat will be shortened from six years to three years. If the decision is made to deploy an NMD system in the near term, then the system we could field in 2003 would provide a very limited capability. If we can avoid deploying a system in the near term, we will continue to enhance the technology base and the commensurate capability of the NMD system that could be fielded on a later deployment schedule.

The issue here is to be in a posture to be three years away from deployment, so that we can respond to the emergence of a threat. It does not make sense to make a deployment decision in advance of the threat, because we would be making investments prematurely, resulting in a system that would be less capable when it is really needed. In the absence of a threat, it is more sensible to continue to enhance the capability of the system that could be deployed when it is needed. This approach fields the most cost effective capability that is available at the time the threat emerges.

The development program that will be executed over the next three years will be a Treaty compliant program. The system components that are ultimately fielded, should a deployment decision be made after three years, might comply with the current treaty, or might require modification of the Treaty, depending on what the threat situation required. At this point, it is important to underscore that there is no commitment today to deploy an NMD capability. The funds to deploy an NMD system are not in the Department's 1997-2001 FYDP.

The Department plans to test a Ground-Based Interceptor (GBI) Exo-atmospheric Kill Vehicle (EKV) in fiscal year 1998 and conduct the first integrated system flight test

of a ground-based interceptor, prototype ground-based radar (GBR), upgraded early warning radars, and improved BM/C3 in fiscal year 1999. In addition, the Air Force is funding and developing the Space and Missile Tracking System (SMTS) as part of the Space-based Infrared System (SBIRS) program. A low earth orbit SMTS would provide 360-degree over the horizon sensing throughout the trajectory of an enemy missile.

CRUISE MISSILE DEFENSE

Many TMD sensors, BM/C3, and weapons also have an effective capability to counter the growing land-attack cruise missile threat. In particular, the lower-tier PAC-3, Navy Area Defense, and MEADS systems operate in the same battlespace and will have capability against the cruise missile threat. In addition, the NMD BM/C3 architecture will be designed to promote interoperability and evolution to a common BM/C3 system for ballistic and cruise missile defense.

The Department also has a number of initiatives outside the BMD program to improve the ability of U.S. forces to detect and defeat cruise missiles "in theater" or launched against the United States. These initiatives include advanced technology sensors to detect low observable cruise missiles; upgrades to existing airborne platforms to improve beyond the horizon detection capability against cruise missiles; an Advanced Concept Technology Demonstration (ACTD) of a new aerostat sensor platform; and upgrades to existing missile interceptor systems.

TECHNOLOGY BASE

The last element of the Department's Ballistic Missile Defense program is the technology base. This program underpins both the TMD and the NMD programs by continuing to advance our capability to counter future and possibly more difficult threats. The BMD technology base allows us to provide block upgrades to our baseline

systems, to perform technology demonstrations for reducing risk and providing a path to speed technology insertion, and to advance some of our basic underlying technologies to provide a hedge against future threats--including research into advanced concepts, such as directed energy systems capable of global coverage.

SUMMARY

In summary, the Department is committed to protecting the United States, including U.S. forces deployed abroad, and our allies against ballistic missile, cruise missile, and weapons of mass destruction threats. We have a comprehensive national security strategy for countering such threats, including preventing and reducing the threat; deterring the threat; and defending against it. Active defense against ballistic missile attack is an important component of that strategy.

Our BMD priorities remain as they were in the past and are reflected in the new budget that includes $2.8 billion in fiscal year 1997. Across fiscal years 1997 through 2001, the Department has budgeted $13.5 billion for Ballistic Missile Defense. This represents about a $3 billion reduction from the baseline established by the President's fiscal year 1996 budget request, in order to support even higher-priority needs in other parts of the Defense budget. Our first priority, Theater Missile Defense, deals with the threat that exists today. The second priority is National Missile Defense. And the third is to support the underlying technology base.

I believe the changes adopted by the Department during the BMD review respond to the threats, to the priorities expressed by the Joint Staff, and also to fact-of-life changes in the program status. The TMD program fully supports deployment of early operational capabilities for the high-priority lower-tier systems, and provides the

ability to deploy upper-tier systems in response to the threat and the availability of funding for those systems.

Our NMD program shifts from a technology readiness posture to a deployment readiness posture. The initial development portion of the program will comply with the Anti-Ballistic Missile Treaty and enable the United States to develop within three years, elements of an initial NMD system that could be deployed within three years of a deployment decision. This approach would preserve thereafter a capability to deploy within three years, while allowing the United States to continue the advancement of technology, add new elements to the system, and reduce deployment timelines.

The NMD system would have the purpose of defending against rogue and accidental/unauthorized threats. It would not be capable of defending against a heavy deliberate attack. Decisions about the treaty compliance of potential NMD systems would be made by the Department of Defense (on advice of the Compliance Review Group). The current program is proceeding, however, in the expectation that a deployment of 100 GBI and one GBR at Grand Forks, North Dakota, would be treaty compliant.

The last element of the Ballistic Missile Defense program is the technology base program. The Department will continue to advance the critical technologies to deal with future threats as they develop.

Mr. Chairman, I thank you for this opportunity to appear before the Committee and shall be happy to answer any questions you may have.

Statement of

The Under Secretary of Defense for Acquisition and Technology
Honorable Paul G. Kaminski

Before the
Subcommittee on Research & Development
of the
House Committee on National Security

on

DoD-Sponsored R&D Centers

March 5, 1996

Mr. Chairman, members of the subcommittee, and staff, thank you for the opportunity to appear before you today to discuss the specifics of the Department's initiatives to strengthen the management and focus of our federally fund research and development centers (FFRDCs) and university affiliated research centers (UARCs).

We are taking these actions to deal with concerns, both real and perceived, that these centers have not been right-sized; that they are working in areas beyond the core interests of the Department; and that the centers are using their special status to gain an unfair competitive advantage over commercial firms. The Department has scrutinized the operations of our FFRDCs and our University Affiliated Research Centers over the past year. We have conducted numerous independent studies and reviews and we have now introduced four major initiatives designed to manage these organizations more effectively, including

- Limiting the program content of these R&D centers to "core work;"
- Establishing stringent criteria for the acceptance of non-core work by an R&D center's parent corporation;

- Chartering an independent advisory committee to review the Department's management and oversight of FFRDCs and UARCs;
- Developing a new set of guidelines to ensure that the management fee provided to FFRDCs is based on justified need.

We believe these initiatives, along with the support of Congress, will effectively address concerns about FFRDC and UARC management and are paving the way for continued use of the critical capabilities provided by these centers. As the Department downsizes, they have become increasingly important as centers of independent technical expertise and support.

FFRDCs

For nearly a half century, the Department has invested heavily in the growth of a strong research and development establishment within the United States to help sustain the technological supremacy of U.S. forces. Today, the Department of Defense (DoD) sponsors 12 not-for-profit, federally funded research and development centers (FFRDCs) to accomplish the following:

- Maintain long-term strategic relationships with their sponsoring DoD organizations;
- Perform research, development and analytic tasks integral to the mission and operations of sponsoring agencies within the DoD;
- Maintain "core" competencies in areas important to the DoD sponsors and employ these competencies to perform high quality, objective work that cannot be carried out as effectively by other organizations; and
- Operate in the public interest, free from real or perceived conflicts of interest.

Three different types of FFRDCs have evolved over time to help the Department accomplish its mission. Seven studies and analyses (S&A) centers provide DoD decision makers with objective evaluations of complex issues. Two systems engineering and integration (SE&I) centers provide experienced engineering and technical support to several DoD research and engineering centers. And finally, three research and development (R&D) centers execute key, leveraging basic research and advanced development programs in support of their DoD sponsors' material development missions.

7 Studies & Analysis Centers

RAND NDRI

RAND Arroyo

RAND Project Air Force

Center for Naval Analysis (CNA)

Logistics Management Institute (LMI)

Institute for Defense Analyses (Studies & Analysis)

Institute for Defense Analyses (OT&E)

2 Systems Engineering & Integration Centers

MITRE C3I

Aerospace Corporation

3 Research & Development Centers

MIT Lincoln Laboratory

Institute for Defense Analyses (C3I)

Software Engineering Institute (SEI)

FFRDCs have played a key role in this nation's defense since World War II. For example, MIT's Lincoln Laboratory was originally formed in 1952 to build a prototype

air defense system against Soviet attack. By the late 1970's, Lincoln Laboratory's extensive experience and "core" competencies in radar clutter phenomenology, measurement and data analysis played a key role in the successful development of U.S. cruise missile systems capable of penetrating Soviet air defenses. This expertise also provided a foundation of knowledge critical to establishing the models and simulations needed for employment of low observables systems such as the F-117.

Similar contributions have been made to this nation's defense over the years by each of the seven studies and analysis FFRDCs. In 1956, the Institute for Defense Analyses (IDA) was formed to help key decision makers in the office of the Secretary of Defense address important national security issues, particularly those requiring scientific and technical expertise. Over the past year, IDA analysts have been instrumental in providing independent, objective assessments of the Department's heavy bomber force needs; a comprehensive tactical utility analysis of the C-17 and Non-Development Airlift Aircraft; and an ongoing study of deep attack weapon systems.

And finally, the Aerospace Corporation--a system engineering and integration center--was founded in 1960 to provide the U.S. Air Force with the technical support needed to acquire and operate space systems, including the related launch and ground systems. Over the past 10 years, the Aerospace Corporation has conducted independent launch readiness verification assessments for over 94 space launches and achieved a 98 percent launch success rate, compared with an 80 percent success rate for U.S. commercial launches over the same period.

UARCs

In addition to the FFRDCs, the DoD sponsors six not-for-profit, private and state university integrated laboratories that:

- Maintain long-term strategic relationships with their DoD sponsoring organizations;
- Receive DoD sole-source funding in excess of $2 million annually to establish/maintain essential research, development and engineering capabilities defined as "core" (contract funding awarded under the authority 10 U.S.C. Section 2304(c)(3)(B), that allows the use of non-competitive procedures in order to establish or maintain an essential engineering, research, and/or development capability); and
- Operate in the public interest, free from real or perceived conflicts of interests.

Each of the DoD sponsored university affiliated research centers, like the FFRDC research and development centers, perform basic research, design and development activities in support of their DoD sponsor's missions.

6 University Affiliated Research Centers

Johns Hopkins University Applied Physics Laboratory (APL)
University of Washington Applied Physics Laboratory (APL)
Pennsylvania State University Applied Research Laboratory (ARL)
University of Texas Applied Research Laboratory (ARL)
Utah State University Space Dynamics Laboratory (SDL)
Georgia Tech Research Institute (GTRI)

The UARCs have maintained a long-term relationship with their DoD sponsor and have contributed greatly to the nation's defense needs. Johns Hopkins University APL--the largest of the DoD sponsored UARCs--invented the concept of satellite navigation that has led to modern global positioning capabilities. Johns Hopkins also played a pivotal role in inventing, developing and prototyping the Navy's Cooperative

Engagement Capability (CEC)--a technological and operational breakthrough that shares information between battle groups in real-time, so that an entire battle group can fight and respond to threats as a single, integrated combat system.

Penn State University ARL is responsible for the design of 21 advanced propulsors and hydrodynamics devices for Navy surface ships, submarines, and torpedoes. PSU ARL conceptualized and demonstrated the key enabling technologies and supporting research for advanced ship self-defense decoys.

The University of Washington APL solved the torpedo influence exploder problems that had plagued Navy torpedoes and is currently directing research at understanding the physics of ocean processes to better predict the performance of underwater systems.

The University of Texas ARL developed the ground station equipment used to track TRANSIT (navigation) satellites and is building the prototype of the MAXUS sonar which will replace mine avoidance sonar on attack submarines.

Utah State University SDL designed and built the Midcourse Space Experiment's SPIRIT III telescoped infrared sensor and functionally demonstrated the feasibility of a Space Based Infrared (SBIR) low earth orbit surveillance concept, now in development as part of the Space Missile Tracking System (SMTS).

The Georgia Tech Research Institute designed and constucted the world's largest Compact Antenna Test Range for the US Army. The range has allowed the Army to map and test microwave antenna patters installed on vehicles as large as the M1 Tank which greatly enhanced the ability to reduce interference and maximize performance.

IMPORTANCE OF R&D CENTERS

The core work that our centers perform is vitally important to our national security. Over the past year, the Department has carefully reviewed its relationships with FFRDCs and UARCs. I formed a senior level DoD Advisory Group to examine the issue, and chartered an independent review by a Defense Science Board task force of the Department's FFRDC management and employee compensation practices. The primary question I posed to both groups was: Do we still need these organizations? The answer was a clear and emphatic "yes."

The Defense Science Board felt that "...the FFRDCs should be retained on the strength of their quality and the special relationships they have with their sponsors on matters which are of great importance to the Department of Defense." Our internal Advisory Group reached a similar conclusion after reviewing alternatives to FFRDCs and UARCs. The bottom line is that we believe--and this belief is held widely in the Department, both by civilian and military leaders--that FFRDCs are doing high-quality, high-value technical and analytic work that could not be provided as effectively by other means. Let me assure you that the people who complain about FFRDCs are not the users of their services or the recipients of their products. FFRDCs and UARCs are doing their jobs for DoD and doing them well.

The essence of their value to DoD lies in the qualities that I mentioned previously, starting with the long-term strategic relationship FFRDCs and UARCs maintain with the Department. I might note that this is one area where DoD has been in front of the commercial sector in its acquisition practices. Successful commercial firms are moving increasingly toward establishing long-term, strategic relationships with trusted suppliers. They have found the result is often a higher quality product, at lower overall costs, in contrast to the previous practice of changing suppliers based on low bids. DoD has long realized this benefit from FFRDCs and UARCs.

I am not arguing that competition is inappropriate. The Department uses competitive processes to obtain the overwhelming majority of the goods and services it requires. But there are some circumstances and some kinds of work, for which the value provided by a strategic relationship outweighs the potential gains of competition.

STRENGTHENED MANAGEMENT PRACTICES

I also asked the DoD Advisory Group to assess the management of FFRDCs and UARCs, and as a result of this review I approved a "DoD Management Action Plan" to ensure the most effective and prudent use of the centers while providing measures to guard against misuse. I forwarded that plan to Congress in May 1995. Since that time, we have introduced a number of initiatives designed to manage these centers more effectively. I will describe four that I believe to be the most important.

First, we have implemented a "core" work concept for managing the workload of the FFRDCs and UARCs. This core concept is what I would describe as a "stick to your knitting" approach in terms of maintaining the capabilities and competencies that are at the core of the strategic relationship. In doing this, each FFRDC/UARC sponsor developed a statement defining what is core work for each center. In addition, each sponsor developed and applied specific core criteria to ascertain whether a task is within the scope of the core statement. These criteria were applied to all ongoing fiscal year 1995 work and to each proposed task submitted for fiscal year 1996. As a result of the program assessment, sponsors identified a total of about $43 million as non-core in the FFRDCs and about $26 million in the UARCs. These non-core tasks have been, or will soon be, transitioned out of the centers in a logical way and be offered to the non-FFRDC private sector, as applicable.

Second, we have established stringent criteria for the performance of non-FFRDC work by the center's parent corporation. Basically, all non-FFRDC work is subject to sponsor review and/or approval and it: (1) must not detract from the performance of FFRDC work, (2) must be in the national interest, (3) must not undermine the independence, objectivity or credibility of FFRDC work, and (4) may not be acquired by taking advantage of access to or information available to the parent through its FFRDC/UARC.

Third, we have an Independent Advisory Committee (IAC), with membership of highly respected people from outside of the Government, to review and advise on the Department's management and oversight of its centers. The IAC has already begun its work and is expected to submit the first report this summer.

Fourth, we developed a revised set of guidelines to ensure the management fees provided to our FFRDCs are based on need and FFRDC provided justification. The new fee guidelines will recognize that FFRDCs, like other defense contractors, incur business expenses that are not allowable charges to their contracts but are instrumental in providing FFRDCs the flexibility to remain centers-of-excellence and sustain successful, high quality operations. However, the new guidelines are expected to reduce the amount of fee, through elimination from fee costs that are reimbursable, and tighter controls of costs that are non-reimbursable, but considered ordinary and necessary.

CORE WORKLOAD

Together, FFRDCs and UARCs account for about 4.8 percent of the President's fiscal year 1996 RDT&E budget request (about $1.7 billion of a total $34.9 billion). Funding for our FFRDCs has come down since the peak levels in fiscal year 1991 at about twice the rate of the overall decline in the Department's RDT&E budget. Another ten percent of the RDT&E budget goes to in-house labs, and the remaining 86 percent goes to industry mostly via competitive processes.

At this point, it is important to underscore that FFRDCs cannot compete by Government-wide regulation and UARCs are precluded by contract from competing for a majority of the 86 percent. It would be inappropriate for organizations with the high level of access to information and close sponsor working relationships maintained by

FFRDCs and UARCs to compete with other firms that do not share this same level of access.

Given the mission of the FFRDCs and UARCs, staff years of technical effort is the best measure for core workload. For FFRDCs, the Director, Defense Research & Engineering (DDR&E) will annually determine how many staff years of technical effort are required by each center based on several factors, including sponsor needs and the guidelines for determining workload for each category of FFRDC. These guidelines, to be applied by the FFRDC sponsor in projecting workload and funding requirements for each category are:

- **Studies and analyses (S&A) centers** shall maintain a relatively stable annual-level-of-effort in order to support core competencies important to their sponsors and to avoid the loss of continuity and expertise that arises from major changes in staff levels. Their core workload will focus on the kinds of work that cannot be as effectively performed either in-house of by other private sector resources.

- **Systems engineering and integration (SE&I) centers** shall maintain a long-term, stable core competency when the sponsor has determined that no in-house or other private sector capability exists to perform the requirement as effectively. SE&I staffing levels will respond to changes in workload and funding consistent with the trend in the most relevant portions of the DoD budget (R&D and/or procurement) supporting the types of programs/ systems within the FFRDC mission area.

- **Research and development (R&D) centers** shall maintain the technical expertise and related core competencies necessary to address those essential

requirements, priorities and objectives of the FFRDC sponsors, the applicable DoD advisory/oversight group and the DDR&E.

From the annual workload requirements provided by the sponsors, the DDR&E will allocate a dollar funding level for each center and maintain a five-year projection for planning purposes. Requests for deviations from or exceptions to established annual funding levels will be submitted for resolution by the FFRDC sponsor, with appropriate justification to the DDR&E.

The process for UARCs is similar to the above, with its focus on ensuring that annual staff years of technical effort at each UARC represents those essential engineering, research, and/or development capability defined in the core statement and awarded non-competitively per 10 U.S.C. 2304(c)(3)B.

As I earlier mentioned, funding for our FFRDCs has been on the decline since fiscal year 1991. This decline has been consistent with the overall trends in defense downsizing and outsourcing. Its consistent with the trends in taking down the force structure as well as the overall budget. I believe we now have reached steady state conditions, and that further reductions beyond the core levels planned for fiscal year 1996 jeopardize the retention of essential core capabilities, and therefore, would be harmful to our national security interests.

FISCAL CEILINGS

The Department has responded to Congressional direction from previous years. We are applying more management attention to FFRDCs, and we intend to continue doing so in the future. Our management processes involve senior leadership of FFRDC sponsoring offices--some of whom are with me today--with broad oversight provided by my office. The Independent Advisory Committee will provide the Department with

an independent assessment of its management activities. The FFRDC program is now among the most intensely scrutinized and overseen in the Department.

In sum, the Department has gotten the message. We have implemented management reforms, and it is now time to restore the normal process for fiscal oversight of FFRDCs and UARCs. Accordingly, we are requesting the four Defense Committees to discontinue the practice--started a few years ago--of inserting special language in annual Bills to limit DoD spending at FFRDCs and UARCs. Such measures are no longer needed, and they constrain unnecessarily DoD's ability to use FFRDCs and UARCs for appropriate work. Let me offer two examples.

First, Lincoln Laboratories--one of our research FFRDCs--must frequently buy advanced components from industry for demonstrations and prototypes in support of Defense programs. These technical subcontracts are in addition to the funding required to support laboratory personnel and ongoing research. Given the continuously decreasing fiscal ceilings provided by Congress, we could only fund these technical subcontracts by reducing some other part of the laboratory program, or by cutting another FFRDC. Neither alternative is desirable.

Second, several FFRDCs are being called upon for technical assistance and analytic support for our Bosnia deployment. These efforts were not planned at the beginning of the fiscal year, and to make room within the fiscal ceilings, we would have to defer other needed FFRDC work. Again, this is not desirable, and it is not good management practice.

As an interim measure for fiscal year 1996, I ask that the Committee support an amendment to the Appropriations Bill that exempts the following FFRDC expenditures from counting against the fiscal year 1996 FFRDC ceiling: (1) major procurements from

industry for demonstrations and prototypes; and (2) technical assistance and analytic support for our Bosnia deployment.

My general point is that no overall fiscal ceilings are imposed on any other class of DoD contractor. In all other cases, the Department is free to select the best mix of contractors to meet our changing needs, consistent with program priorities and funding provided by the Congress. The additional constraints on DoD FFRDCs and UARCs are not required. They inhibit the Department's ability to allocate resources flexibly to get the most efficient mix of technical and analytic support. I would appreciate the Committee's support in allowing DoD to manage its FFRDCs without externally imposed fiscal ceilings.

MITRE RESTRUCTURE

On a separate, but related issue of high interest, I want to reiterate the Department's general support for the MITRE Corporation's split into two separate, non-affiliated companies, with no common Trustees, officers or staff. The "MITRE Corporation" will continue to operate its two existing FFRDCs (the C3I FFRDC for DoD and the Center for Advanced Aviation System Development FFRDC for the FAA). The new entity will be a not-for-profit corporation formed out of the two non-FFRDC divisions from the old MITRE.

The Department believes that the split will focus the MITRE Corporation on its FFRDC operations and neutralize any concern about the use of FFRDC status to gain unfair advantage over commercial firms. The Department did not specifically mandate the split, but it did establish firm new rules regarding non-FFRDC activities, and the split was MITRE's response.

SUMMARY

To summarize the Department's initiatives to strengthen FFRDC and UARC management:

- The work content and the operations of each of these centers have been closely scrutinized over the past year. FFRDCs and UARCs are sized consistent with essential sponsor requirements, defense acquisition reform initiatives, strategies and budgets.

- We have strengthened our management controls, including managing the workload of our centers to the core concept; transitioning ongoing work that is non-core out of the centers; and developed consistent management fee guidelines.

- We have established new stringent criteria for the performance of non-FFRDC work by the parent corporation of an FFRDC.

- The "Independent Advisory Group" is operating as a source of judgment to help communicate to the Congress and the public the adequacy of DoD management actions

In closing, let me underscore my own sense and that of the entire team here. The FFRDCs and UARCs are critically important national assets. They have provided key contributions in the past and will address critical needs now and in the future. Proactive management on the part of the Department will ensure the sustainment of these contributions. These assets are the kind that take a long time to develop and their long-term care is of the utmost importance to all of us--we need the Congress' continued support.

Mr. Chairman, thank you for this opportunity to report on the DoD-sponsored FFRDCs and UARCs.